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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/674,926

09/30/2003

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YOR920030005

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34663 7590 12/11/2008
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EXAMINER

BRADLEY, MATTHEW A

ART UNIT

PAPER NUMBER

2187

NOTIFICATION DATE

DELIVERY MODE

12/11/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/674,926 | Applicant(s) OLSEN ET AL. | |
| | Examiner MATTHEW BRADLEY | Art Unit 2187 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21,22,24-35,37 and 38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21,22,24-35,37 and 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 17 November 2008 has been entered.

Claim Status

Claims 21-22, 24-35, and 37-38 remain pending and are ready for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims **21-22, 24-26, 29-31, 33, and 37-38** are rejected under 35 U.S.C. 103(a) as being obvious over Rudelic et al (U.S. 2004/0255283), hereinafter referred to as Rudelic, and in view of Mirov et al (U.S. 6,836,824), hereinafter referred to as Mirov.

As per independent claim **21**, Rudelic teach,

- first and second of levels of a non-volatile storage hierarchy, (Paragraph 0046: taught as the first and second flash memories).

- wherein accessing information in the first level consumes more energy than accessing information in the second level; and (Paragraph 0046: taught as the high performance first flash memory and rate of power consumption thereto).
- a processor configured for writing information to the second level of storage based on energy-conserving criteria and excluding storing only minimally used portions of information (Processor as shown in Figure 1 item 20 and as taught in Paragraph 0017 and further in paragraph 0046).
- wherein the energy-conserving criteria comprise system state information (Paragraph 0049: taught as performance metrics).

Rudelic is silent however on, wherein said system state information is selected from a type of energy source powering the system.

Mirov teach, wherein said system state information is selected from a type of energy source powering the system (Figure 18 as taught in Column 21 lines 19-57: taught as the level of power which anticipates the energy source).

Rudelic and Mirov are analogous art because they are from the same field of endeavor, namely power management in computing systems.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art, having both the teachings of Rudelic and Mirov before him/her, to implement the power management of Mirov into the system of Rudelic to exploit the benefit of reducing power consumption based on the level of power to prevent unnecessary consumption of power.

The motivation for doing so would have been that, a power supply without the features of the instant invention may continue to operate in the same mode, making the same amount of power available despite the fact that the computer system may not require the amount of power currently being made available. This excess power results in the unnecessary consumption of power (Mirov: Column 21 lines 30-35). The Examiner notes that combining Mirov with Rudelic would have yielded predictable results in offering the combination system the benefit of reducing power consumption.

Therefore it would have been obvious to combine Rudelic with Mirov to exploit the benefit of reducing power consumption based on the level of power to prevent unnecessary consumption of power to obtain the invention as specified in claims 21-22, 24-26, 29-31, 33, and 37-38.

As per dependent claim **22**, the combination of Rudelic and Mirov teach, wherein the energy-conserving criteria comprise criteria complied using a heuristic approach (Rudelic: Paragraphs 0048-0049 taught as the tracking and gathering of performance metrics).

As per dependent claim **24**, the combination of Rudelic and Mirov teach, further comprising a storage input/output subsystem and wherein the system state information comprises whether the storage input/output subsystem is using one or more specific files (Rudelic: Paragraph 0046: taught as the determination of minimally used portions and thus files of the operating system).

As per dependent claim **25**, the combination of Rudelic and Mirov teach, wherein the system state information is selected from the group consisting of: the storage

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input/output associated with one or more predetermined software applications; a sequence of storage input/output operations; observed interactions with the first level of the storage hierarchy and wherein the collection of heuristics infer the state of the second level of the storage hierarchy (Rudelic: Paragraph 0048: taught as the migration of code due to usage corresponding to the limitation of a sequence of storage input/output operations).

As per dependent claim **26**, the combination of Rudelic and Mirov teach, wherein the energy-conserving criteria comprise limiting use of parts of a file system (Rudelic: Paragraph 0046: taught as the migration of portions of the operating system off the first flash memory and thus limiting the use of the first flash memory).

As per dependent claim **29**, the combination of Rudelic and Mirov teach, wherein the system state information comprises at least one factor from among the following factors: the storage input/output data associated with the characteristics of the connection between the first and second levels of the storage hierarchy; the storage input/output data associated with characteristics of the connection between the system and at least one second level of the storage hierarchy; the proximity of the storage input/output to events that change the state of the at least one first level of the storage hierarchy; the proximity of the storage input/output to a previous interaction with at least one first level of storage hierarchy; an indication of a hard-disk drive spin-down event; and physical characteristics of the second levels of the storage hierarchy (Rudelic: Paragraph 0049: taught as the performance metrics).

As per dependent claim **30**, the combination of Rudelic and Mirov teach, wherein the system state information comprises physical characteristics of the second level of the non-volatile storage hierarchy (Rudelic: Paragraph 0049: taught as the performance metrics).

As per dependent claim **31**, the combination of Rudelic and Mirov teach, wherein the second level of the non-volatile storage hierarchy is implemented using Flash memory (Rudelic: Paragraph 0046).

As per dependent claim **33**, the combination of Rudelic and Mirov teach, wherein the processor is for removing information from the second level of non-volatile storage based on energy-conserving criteria (Rudelic: Paragraph 0048: taught as a code object promotion).

As per independent claim **37**, the combination of Rudelic and Mirov teach,

- two levels of non-volatile storage wherein a first level is managed and a second level is unmanaged wherein storing information in managed storage consumes less system resources than storing information in unmanaged storage, the method comprising: (Rudelic: Paragraph 0046: taught as the first and second flash memories)
- monitoring the system to determine whether the operating state of the system satisfies one or more energy-conserving criteria; and storing only strategically selected storage data in managed storage when the operating state of the system satisfies one or more energy-conserving criteria; (Rudelic: Paragraphs 0046-0049) and

- storing all storage data in unmanaged non-volatile storage when the operating state of the information processing system does not satisfy the one or more energy-conserving criteria; (Rudelic: Paragraph 0047 taken in combination with Mirov Column 21 lines 19-57). *The Examiner notes that when taken in combination, the combination of Rudelic and Mirov obviates that which is instantly claimed.*
- wherein the energy-conserving criteria comprise system state information, and wherein said system state information is selected from a type of energy source powering the system (Mirov: Figure 18 as taught in Column 21 lines 19-57: taught as the level of power which anticipates the energy source).

As per independent claim **38**, the combination of Rudelic and Mirov teach, a computer readable medium comprising program instructions for: (Rudelic: Claim 12) monitoring a system to determine whether the operating state of the system satisfies one or more energy-conserving criteria; and storing only strategically selected storage data in managed non-volatile storage when the operating state of the system satisfies one or more energy-conserving criteria (Rudelic: Paragraphs 0046-0049); storing all storage data in unmanaged non-volatile storage when the operating state of the information processing system does not satisfy the one or more energy-conserving criteria; (Rudelic: Paragraph 0047 taken in combination with Mirov Column 21 lines 19-57: The Examiner notes that when taken in combination, the combination of Rudelic and Mirov obviates that which is instantly claimed) wherein the energy-conserving criteria

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comprise system state information, and wherein said system state information is selected from a type of energy source powering the system (Mirov: Figure 18 as taught in Column 21 lines 19-57: taught as the level of power which anticipates the energy source).

Claims **27-28** are rejected under 35 U.S.C. 103(a) as being obvious over Rudelic in view of Mirov, and further in view of Thelander et al. (U.S. 2003/0009705) hereinafter referred to as Thelander.

As per dependent claim **27**, the combination of Rudelic and Mirov teach the limitations as noted *supra*.

The combination of Rudelic and Mirov teach is silent however on, the system stores current user profiles and the system state information comprises whether storage input/output data are associated with a current user profile.

Thelander, the system stores current user profiles and the system state information comprises whether storage input/output data are associated with a current user profile (Paragraph 45 and Paragraph 48 and Paragraph 53).

Rudelic and Mirov, and Thelander are analogous art because they are from the same field of endeavor, namely power management in computing systems.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art, having both the teachings of Rudelic and Mirov, and Thelander before him/her, to implement the power management profiles of Thelander into the system of Rudelic and Mirov to exploit the benefit of multiple power profiles based on a user's preferences.

The motivation for doing so would have been that, the power management profile may include multiple power settings or power schemes with the same schedule, so that the user may select between different power settings or schemes to be implemented (Paragraph 45 and Paragraph 48 and Paragraph 53).

Further, it would have been obvious to implement different user profiles based on user preferences. Doing so would yield predictable results in offering the combination system the benefit of serving multiple users with different needs.

Therefore it would have been obvious to combine Rudelic and Mirov, with Thelander to exploit the benefit of multiple power profiles based on a user's preferences to obtain the invention as specified in claims 27 and 28.

As per dependent claim **28**, the combination of Rudelic, Mirov, and Thelander teach, wherein the system stores current user preferences and the system state information comprises whether storage input/output data are associated with current user preferences (Thelander: Paragraph 45 and Paragraph 48 and Paragraph 53).

Claim **32** is rejected under 35 U.S.C. 103(a) as being obvious over Rudelic in view of Mirov, and further in view of Atkinson (U.S. 6,029,249) hereinafter referred to as Atkinson.

The combination of Rudelic and Mirov teach the limitations as noted *supra*.

The combination of Rudelic and Mirov does not teach counting remaining write cycles.

Atkinson teach, wherein the system state information comprises the number of remaining write cycles (Column 8 lines 48-51).

Rudelic and Mirov, and Atkinson are analogous art because they are from the same field of endeavor, namely computer system power consumption.

At the time of invention it would have been obvious to one of ordinary skill in the art, having both the teachings of Rudelic and Mirov, and Atkinson before him/her, to implement the counter of Atkinson into Rudelic and Mirov for the benefit of reducing system clock when on supplemental power to increase run time.

The motivation for doing so would have been that, a lower event count causes the frequency switching circuit to switch to a lower frequency to conserve power if the system is not already at this low frequency ... the invention allows the battery powered operating period of a computer system to be greatly extended (Column 3 lines 4-8 of Atkinson).

Therefore it would have been obvious to combine Rudelic and Mirov, with Atkinson for the benefit of increased run time to obtain the invention as specified in claim 32.

Claims **34** and **35** are rejected under 35 U.S.C. 103(a) as being obvious over Rudelic in view of Mirov, and further in view of Kimura et al (U.S. 6,415,359) hereinafter referred to as Kimura.

As per dependent claim **34**, the combination of Rudelic and Mirov teach a system that stores portions of operating systems into a hierarchical non-volatile storage device as noted above. In one embodiment, the portions are selected based on usage and stored into the different levels of flash memory based on various performance metrics

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that are gathered and tracked by the system of Rudelic to improve power consumption (Paragraphs 0046-0049 of Rudelic).

The combination of Rudelic and Mirov however, does not teach usage of disk based non-volatile storage devices and as a result is silent on, a mapping schema between cache files in the second level of storage and disk files in the first level of storage, wherein each cache file is named with a logical cluster number of its corresponding disk file

Kimura teach usage of disk based non-volatile storage devices and the transferring of files from the disk device to a cache to improve power consumption (Abstract of Kimura) and further, a mapping schema between cache files in the second level of storage and disk files in the first level of storage, wherein each cache file is named with a logical cluster number of its corresponding disk file (Column 7 lines 31-45 of Kimura).

All of the component parts are known in both Rudelic and Mirov, and Kimura. The only difference is the combination of the “old elements” into a single device by combining them for usage in one system.

Thus, it would have been obvious to one of ordinary skill in the art to combine the disk device of Kimura into the system of Rudelic and Mirov. This would allow the system of Rudelic and Mirov, to enjoy further power consumption benefits by expanding the hierarchy of non-volatile storage devices and giving an additional level of demotion to the system. Thus, objects that are given demotions based on usage from the first flash memory to the second flash memory would be continued to be monitored and

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further demoted to the third level offered by Kimura and accordingly would allow the system to achieve predictable results of improved power consumption.

As per dependent claim **35**, the combination of Rudelic, Mirov, and Kimura teach,

- comprising a hard disk drive comprising rotating magnetic media comprising the first level storage and a cache comprising the second level storage and (Column 3 line 55 to Column 4 line 15 of Kimura and the cache as taught by the flash memories of Rudelic in Paragraph 0046).
- an application-specific integrated circuit for managing the cache according to the energy-conserving criteria (Column 3 lines 41-54 of Kimura).

Response to Arguments

Applicant's arguments filed 17 November 2008 have been carefully and fully considered but are only partially persuasive.

With respect to Applicant's argument located within the fifth paragraph of the second page of the instant remarks (numbered as page 8) which recites:

"Thus, the rejection of claim 25 did not even mention the limitation of "wherein the energy-conserving criteria comprise a type of energy source powering the system."

The Examiner respectfully refers Applicants to the rejection of claim 21 made *supra*.

With respect to Applicant's argument located within the last paragraph of the second page of the instant remarks (numbered as page 8) and continuing through to the top of the third page of the instant remarks (numbered as page 9) which recites:

"Moreover, as previously pointed out, energy-conserving criteria are not the same as power conserving criteria. In response to this basic and undeniable truth the Examiner responded by improperly importing the limitation of a fixed access

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time (T). This is improper because nowhere in the claim is there a limitation that access time be held constant."

The Examiner respectfully disagrees and notes herein that the instant claim language does not recite and therefore does not require that the first and second levels of a non-volatile storage hierarchy have different access times. If it is Applicant's intent for the access times to be different, then it must be clearly stated.

With respect to Applicant's argument located within the first and second full paragraphs of the third page of the instant remarks (numbered as page 9) which recites in part:

"Independent claim 37 has been amended to incorporate the step of "storing all storage data in non-managed non-volatile storage when the operating state of the system does not satisfy the one or more energy-conserving criteria." This limitation is also found in claim 38 and is missing from the prior art."

The Examiner respectfully refers Applicants to the rejection of claims 37 and 38 made *supra* and notes further that the combination of Rudelic and Mirov teach a system that stores the critical objects of Rudelic in the high performance first flash memory (Rudelic: Paragraph 0047), when the system is running in a full power mode or normal mode as taught in Mirov Column 4 lines 54-57 so as to enable full performance of the system.

With respect to Applicant's argument located within the last full paragraph of the third page of the instant remarks (numbered as page 9) which recites in part:

"As shown above, power conservation is not the same, or the equivalent of, energy conservation. Therefore, the combination of Rudelic and Thelander do not teach or suggest the use of energy-conserving criteria (as claimed in claim 21, from which claims 27 and 28 depend)."

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The Examiner respectfully disagrees and notes that no new rationale, let alone any rationale, is presented regarding power conservation being different from energy conservation. Thus, the Examiner incorporates by reference herein the comments made in the Final Rejection mailed 16 May 2008 found on pages 13 and 14.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Bradley whose telephone number is (571) 272-8575. The examiner can normally be reached on 6:30-3:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Ellis can be reached on (571) 272-4205. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KLE/mb

/Kevin L Ellis/
Acting SPE of Art Unit 2187